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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/569,006	02/21/2006	Katsumi Morikawa	7620-X06-005	1756
27317 7590 05/08/2007 FLEIT KAIN GIBBONS GUTMAN BONGINI & BIANCO 21355 EAST DIXIE HIGHWAY SUITE 115 MIAMI, FL 33180			EXAMINER KERNS, KEVIN P	
			ART UNIT 1725	PAPER NUMBER
			MAIL DATE 05/08/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/569,006

Applicant(s)

MORIKAWA ET AL.

Examiner

Kevin P. Kerns

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 14-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 29 and 30 are objected to because of the following informalities: in both claims, replace "steal" with "steel". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 14-20, 22, 23, 25, 27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-39214 in view of JP 2002-239690.

JP 8-39214 discloses an immersion nozzle for use in a method of continuous casting of clean molten steel, in which the nozzle includes an inner hole 3 having a wall surface that comes in contact with the molten steel, with the wall surface being formed (either entirely or at least in part) of tubular-shaped refractory layers (2,6), such that the refractory layer 2 is carbonaceous (graphite-containing) and the refractory layer 6 is comprised of 5-87 wt% CaO, 10-92 wt% MgO, and 2-15 wt% SiO<sub>2</sub> (inclusive of <5 wt% antioxidant Si) over a wide range of various controlled weight ratios (inclusive of CaO + MgO being 65 wt% or more, and containing at least a trace amount of carbonaceous material(s) near the contact region of carbonaceous refractory layer 2), as well as controlled low porosities and layer thicknesses based upon the weight ratios, as one of ordinary skill in the art would have recognized based upon the temperatures reached in the continuous casting apparatus (abstract; paragraphs [0012]-[0040] of Japanese text; and Figures 1-3). JP 8-39214 does not disclose the use of a swirl vane provided in the inner hole of the nozzle, such that a portion of the refractory layer would be upstream of the swirl vane.

However, JP 2002-239690 discloses an immersion nozzle for use in a continuous casting method of cast slabs, in which the immersion nozzle includes a spiral-shaped swirling blade/vane (at a 60-180 degree twist angle) provided in a tier portion (adjacent the reduced diameter region arranged in roughly the center of the immersion nozzle which would contain the refractory material subject to high temperatures within the nozzle at locations both upstream and downstream of the swirling blade/vane – see Figures 1 and 3) of the inner hole of the nozzle, such that the

swirling blade/vane is advantageous for improving the cast slab surface and for reducing porosity defects at the center part of the cast slab (abstract; and Figures 1, 3, 5, and 14).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the immersion nozzle for use in a method of continuous casting of molten steel, as disclosed by JP 8-39214, by using a swirl vane provided in the inner hole of the nozzle, such that a portion of the refractory layer would be upstream of the swirl vane, as taught by JP 2002-239690, in order to improve the cast slab surface and to reduce porosity defects at the center part of the cast slab (JP 2002-239690; abstract).

5. Claims 21, 24, 26, 28, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-39214 in view of JP 2002-239690, as applied to claims 14 and 25 above, and further in view of JP 10-263765.

JP 8-39214 (in view of JP 2002-239690) disclose and/or suggest the elements of independent claims 14 and 25. Neither JP 8-39214 nor JP 2002-239690 discloses the use of an inert gas injection port and supply of inert gas provided above the swirl vane within the immersion nozzle.

However, JP 10-263765 discloses a method for controlling molten metal flow by an immersion nozzle in a continuous casting apparatus, in which the immersion nozzle 5 includes a gas injecting hole 3 and a plurality of slits 2 for introducing gas in the upper portion of the nozzle 5 (which would also be located above the swirl vane of JP 2002-

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239690), in which the inert gas injection port and supply of inert gas provided above the swirl vane within the immersion nozzle are advantageous for uniformizing the flow speed of molten metal from the nozzle while developing stirring flow through the nozzle, which would result in restraining development of defects/inclusions into the molten metal (abstract; and Figures 1-6).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the immersion nozzle for use in a method of continuous casting of molten steel, as disclosed by JP 8-39214, by using a swirl vane provided in the inner hole of the nozzle, such that a portion of the refractory layer would be upstream of the swirl vane, as taught by JP 2002-239690, in order to improve the cast slab surface and to reduce porosity defects at the center part of the cast slab, and by further providing an inert gas injection port and supply of inert gas provided above the swirl vane within the immersion nozzle, as disclosed by JP 10-263765, in order to uniformize the flow speed of molten metal from the nozzle while developing stirring flow through the nozzle, which would result in restraining development of defects/inclusions into the molten metal (JP 10-263765; abstract).

### ***Response to Arguments***

6. The examiner acknowledges the applicants' amendment received by the USPTO on April 23, 2007. The amendments overcome prior objections to the abstract, specification, and claims, as well as prior 35 USC 112, 2<sup>nd</sup> paragraph rejections. However, new claim objections have been raised upon addition of new claims 29 and

30 (see above section 1). The applicants have added new claims 27-31. Claims 14-31 are currently under consideration in the application.

7. Applicants' arguments filed April 23, 2007 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on page 8 of the amendment, it is noted that newly underlined portions in above sections 4 and 5 have been added to reflect the applicants' amendments. The applicants' major argument is that the combined teachings of JP 8-39214 in view of JP 2002-239690 under 35 USC 103(a) do not disclose/suggest the limitation "a refractory layer containing CaO and MgO forming at least a part of said wall surface upstream of said swirl vane". The examiner respectfully disagrees with this argument, as JP 8-39214 discloses such a refractory layer 6 covering the entire inner surface of the nozzle, and being comprised of 5-87 wt% CaO, 10-92 wt% MgO, and 2-15 wt% SiO<sub>2</sub>. On the other hand, JP 2002-239690 discloses an immersion nozzle that includes a spiral-shaped swirling blade/vane arranged roughly in the center of the nozzle (i.e. at locations in which the refractory layer 6 of JP 8-39214 would entirely cover along the length of the nozzle), with the motivation being to improve the cast slab surface and to reduce porosity defects at the center part of the cast slab (JP 2002-239690; abstract). Despite the applicants' statements regarding the advantages of their invention (see the 3 paragraphs that begin with "The specification..." in the middle of page 8 of the remarks), none of these statements are particularly pertinent to the claims, in the absence of an affidavit or

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declaration that states otherwise. In addition, it is noted that the applicants did not specifically address the alleged deficiencies of the JP 10-263765 reference. As a result, claims 14-31 remain rejected as set forth in above sections 4 and 5.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns *Kevin Kerns* 5/4/07  
Primary Examiner  
Art Unit 1725

KPK  
kpk  
May 4, 2007